3-27

ME3387

CODE TRANSLATOR MODULE
NASA 36-BIT
TIME CODE

(Part No. 6220-906)

ASTRODATA

240 E. Palais Rd., Anaheim, California

INSTRUCTION MANUAL

CODE TRANSLATOR MODULE

NASA 36-BIT

TIME CODE

(Part No. 6220-906)

Digitized by the Internet Archive
in 2026

https://archive.org/details/manualsplus_13239

NASA 36-BIT TIME CODE

The NASA 36-Bit Timing Diagram 1 shows the carrier envelope beginning at 940 milliseconds in the forward direction. The carrier frequency (ZA) is used to develop the master clock (MC). FD3 follows the envelope but is delayed by two carrier cycles (2 milliseconds). Pulse Rate Reset (PRR) is initiated by the negative-going transition of FD3 and is one-half cycle (0.5 millisecond) in duration. The pulse width generator (C1 through C9) is set to two (C1 off, C2 through C9 on) by PRR, putting it on time with the carrier.

The binary one recognition gate allows FD5 to sample for BIN 1 from C5 to C7 time, enabling FD5 to be true 0.5 millisecond after C5 time when a BIN 1 is present. FD5 goes false 0.5 millisecond after the start of the next C1 time.

The reference counter is clocked by FD5. Upon reaching a count of five, it generates a one-millisecond Frame Rate Reset (FRR) on the next C9 time. The count of five is held and FRR is generated on each C9 time until a binary zero is recognized, allowing the reference counter to reset on the following C1 time.

FRR resets the bit weight decoder and the minor time counter, thus, for decoding purposes in the forward direction, zero count is 10 milliseconds after the start of the code frame.

FD6 is enabled during the first C9 time after FD5 is true. FD6 remains true until the C9 time after FD5 has remained false, giving a binary one output delayed by one pulse from

the carrier. The binary one term drives a FWD or REV reset driver which generates the FD6*FWD or FD6*REV (-18 volt). These terms drive the appropriate bit weight gates in the code translator module.

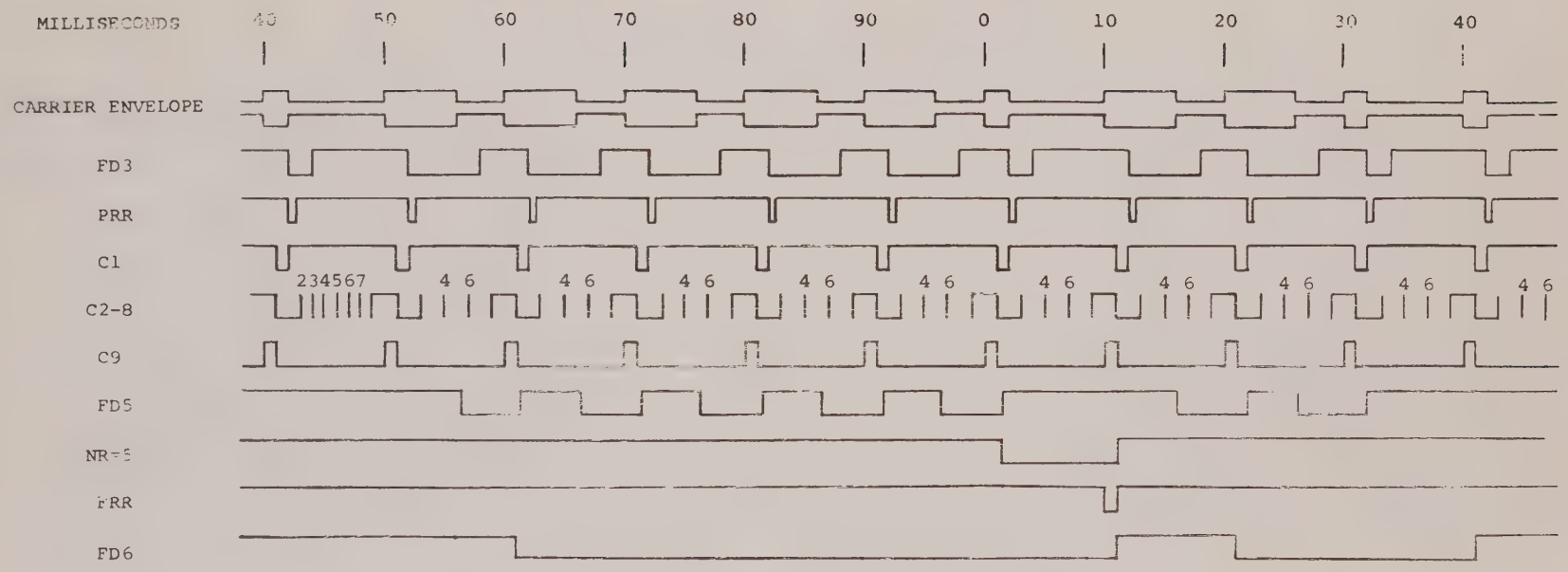
Three additional terms are required to decode a bit. These are: C1 through C9, DM00 through DM09, and DM10 through DM19. For example, to Count Units of Seconds (CUS) in the forward direction, the following gating is required: C1•DM01•DM10 + C2•DM02•DM10 + C4•DM03•DM10 + C8•DM04•DM10, all enabled by FD6*FWD.

The NASA 36-Bit Timing Diagram 2 shows the carrier envelope beginning at 950 milliseconds in the reverse direction. FD3 follows the envelope but is delayed by two carrier cycles (2 milliseconds). Pulse Rate Reset (PRR) is initiated by the positive-going transition of FD3 and is one-half cycle (0.5 millisecond) in duration. The pulse width generator (C1 through C9) is set to two (C1 off, C2 through C9 on) by PRR, putting it on time with the carrier.

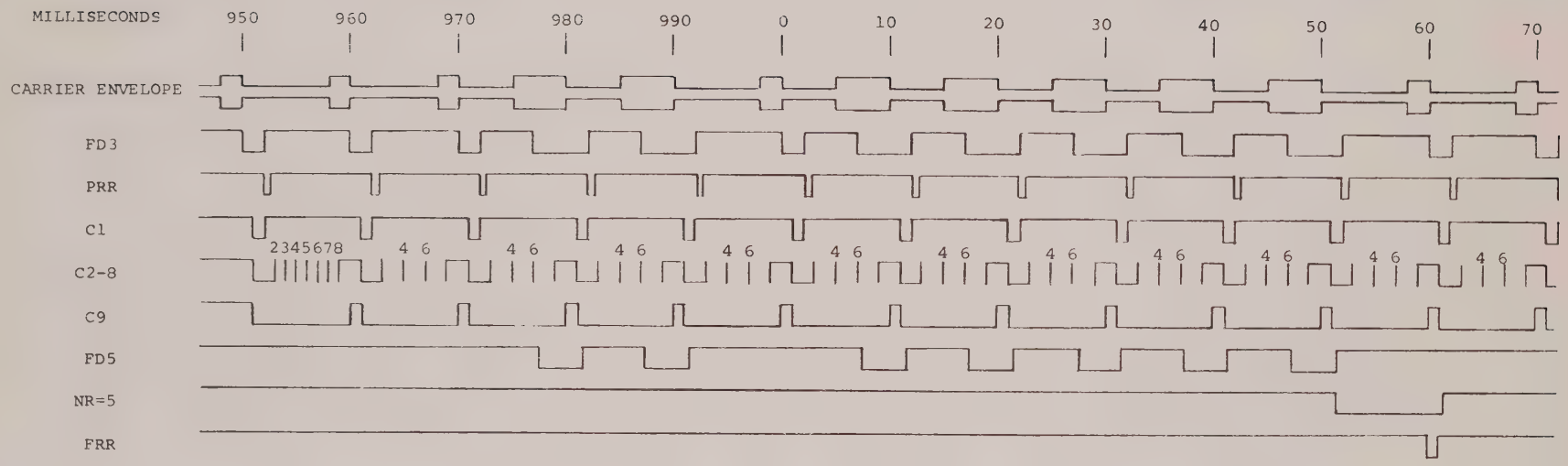
The binary one recognition gate allows FD5 to sample for BIN 1 from C5 to C7 time, enabling FD5 to go true 0.5 millisecond after C6 time when a BIN 1 is present. FD5 goes false 0.5 millisecond after the start of the next C1 time.

The reference counter is clocked by FD5. Upon reaching the count of five, it generates a one-millisecond Frame Rate Reset (FRR) on the next C9 time. If additional "ones" are present, the counter continues counting until a binary zero is recognized, allowing the counter to reset on the following C1 time.

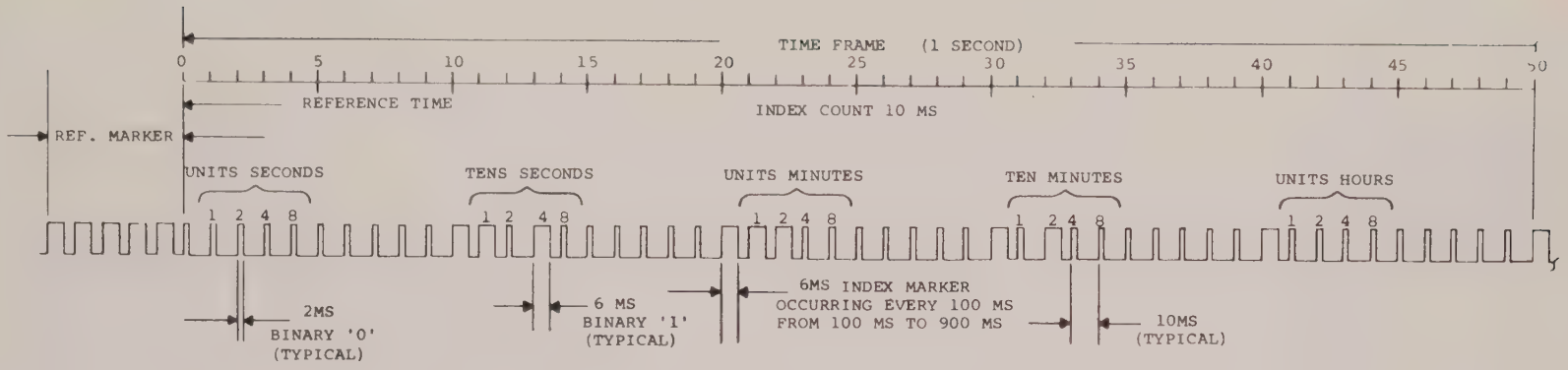
FRR resets the decode DCUs (DM terms) and jams the minor time counter, thus, for decoding purposes in the reverse direction, zero count is 60 milliseconds after the start of the code frame.

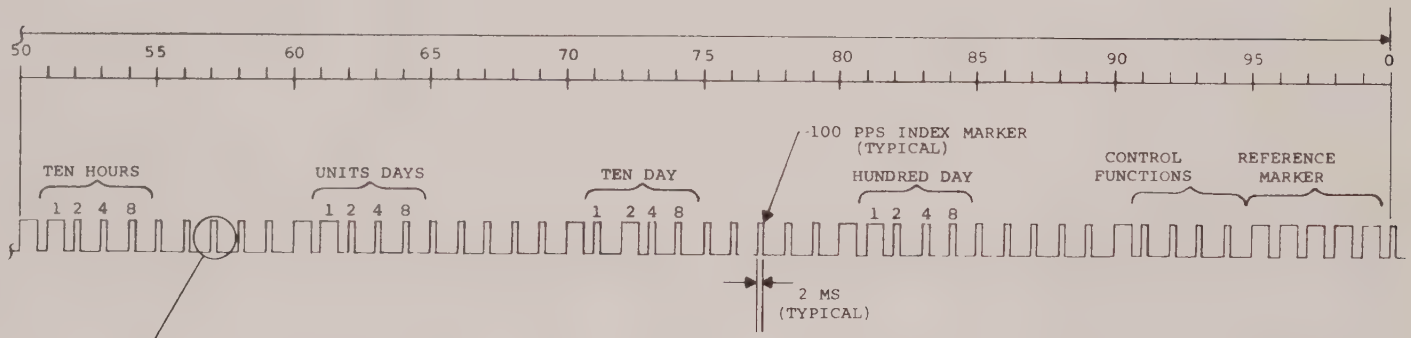


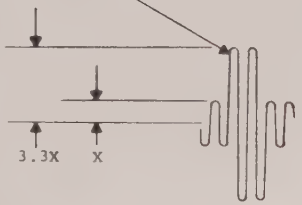
NASA 36-Bit, Timing Diagram 1



NASA 36-Bit, Timing Diagram 2







TYPICAL MODULATED CARRIER
Recommended Frequency 1000 cps

Time at Reference Marker is: 121 Days, 10 Hrs., 23 Mins., 41 Sec.

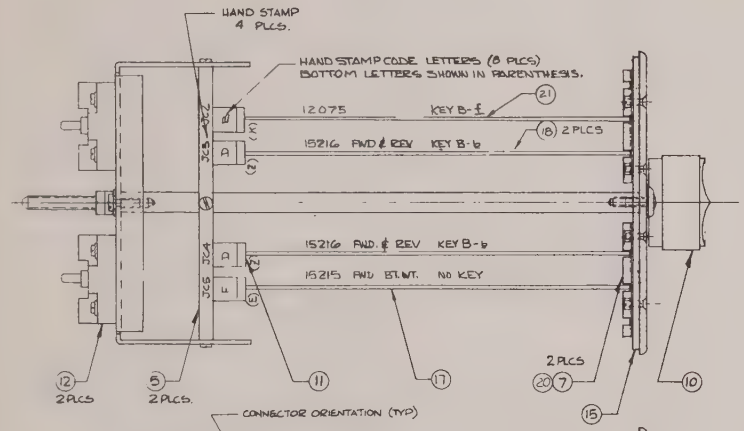
The **NASA 36-Bit Time Code** is a 100 pps pulse width modulated time code. This code may be used to amplitude modulate a 1000 cps sine wave carrier

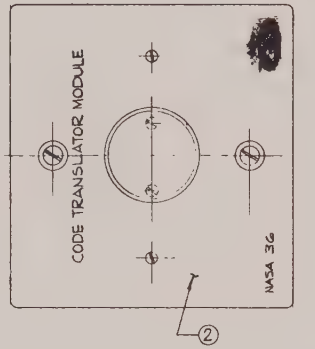
The code is composed of a **Reference Marker** and nine sub-code words, which describe time-of-year in seconds, minutes, hours and days. Each sub-code is weighted in binary-coded decimal fashion. The leading edge of all pulses are precisely spaced at 10 milliseconds intervals. The **Time Frame** is completed by 100 pps index markers and by index markers occurring every 100 milliseconds from 100 milliseconds to 900 milliseconds

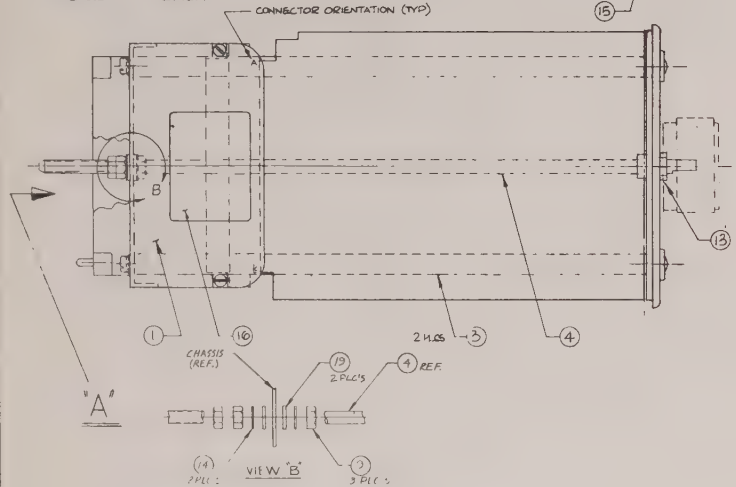
The frame **Reference Marker** is described by five binary **one's** followed by a binary **zero**. The leading edge of the binary **zero** is the reference time

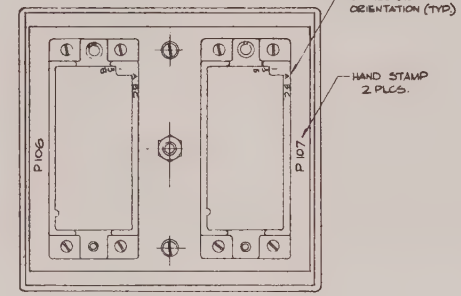
The **Time Frame** provides for the insertion of control functions for identifying the recording station

NASA 36-BIT TIME CODE
Reference IRIG Document 104-59









VIEW IN DIRECTION OF ARROW "A"

REV.	E.C.	DESCRIPTION	DRN	APPD	DATE
A		CHANGED ITEM 4 — WAS 6220-372, DELETED ITEM 6 (9157-038), ITEM 10 WAS COUPLING #2316-A, ITEM 14 WAS "E" RING #5183-218	LRS	[illegible]	4-11-62
B		ADDED NYLON WASHER (ITEM 19)	SR	[illegible]	12-9-64
C		CHANGED P/N WAS A34	SR	[illegible]	12-21-64
D	7417	ADDED ITEM 20 AMP CONN. WAS KENNEDY REMOVED WEB	SR	RCR	10-21-64
E	8739	ADDED 12075 IN JC2	V.L.	RCR	5/31/65
(MF) F	9608	HAND STAMP ARCS WAS 3 PLCS ITEM 9 WAS QTY 3	GR	R.R.	6-25-5

ITEM	QTY	PART NO.	REF DES	DESCRIPTION	SPEC	MFR
21	1	12075		CIRCUIT CARD ASSY.		ASTRODATA
20	1	6220-1330		SPACER		
19	2	3607 2.8		NYLON WASHER 1/4 DIA		SEASTRAM
18	2	15216		CIRCUIT CARD ASS'Y		ASTRODATA
17	1	15215		CIRCUIT CARD ASS'Y		
16	1	6220 [illegible]		[illegible]		
15	1	6220-376		LOCATING PLATE		ASTRODATA
14	2	AN960 416		FLAT WASHER 1/4 DIA		
13	1	#1560-1		BUSHING 3/8-32 X 7/16 LG.		USECO
12	2	MB000-140-6	P106-P107	PLUG		ELCO
11	4	SP"S-93	JC7-6	CONNECTOR		AMP
10	1	#175-2-26		KNOB		RAYTHEON
9	2			HEX. NUT 1/4-20		
7	2	6220-342		CARD GUIDE, MODIFIED		ASTRODATA
6						
5	2	6220-318		CONNECTOR BAR		
4	1	6220-303		[illegible]		
3	2	6220-321		SUPPORT BAR		
2	1	6220-317		FRONT PLATE		
1	1	6220-320		CONNECTOR BKT.		ASTRODATA

QTY PER ASSY | LIST OF MATERIAL

COPYRIGHT 1966 ASTRODATA INC

2 FOR WIRING INFO SEE 6220-7600
1. FOR ENGRAVING SEE DWG. NO. 6220-398
NOTES:

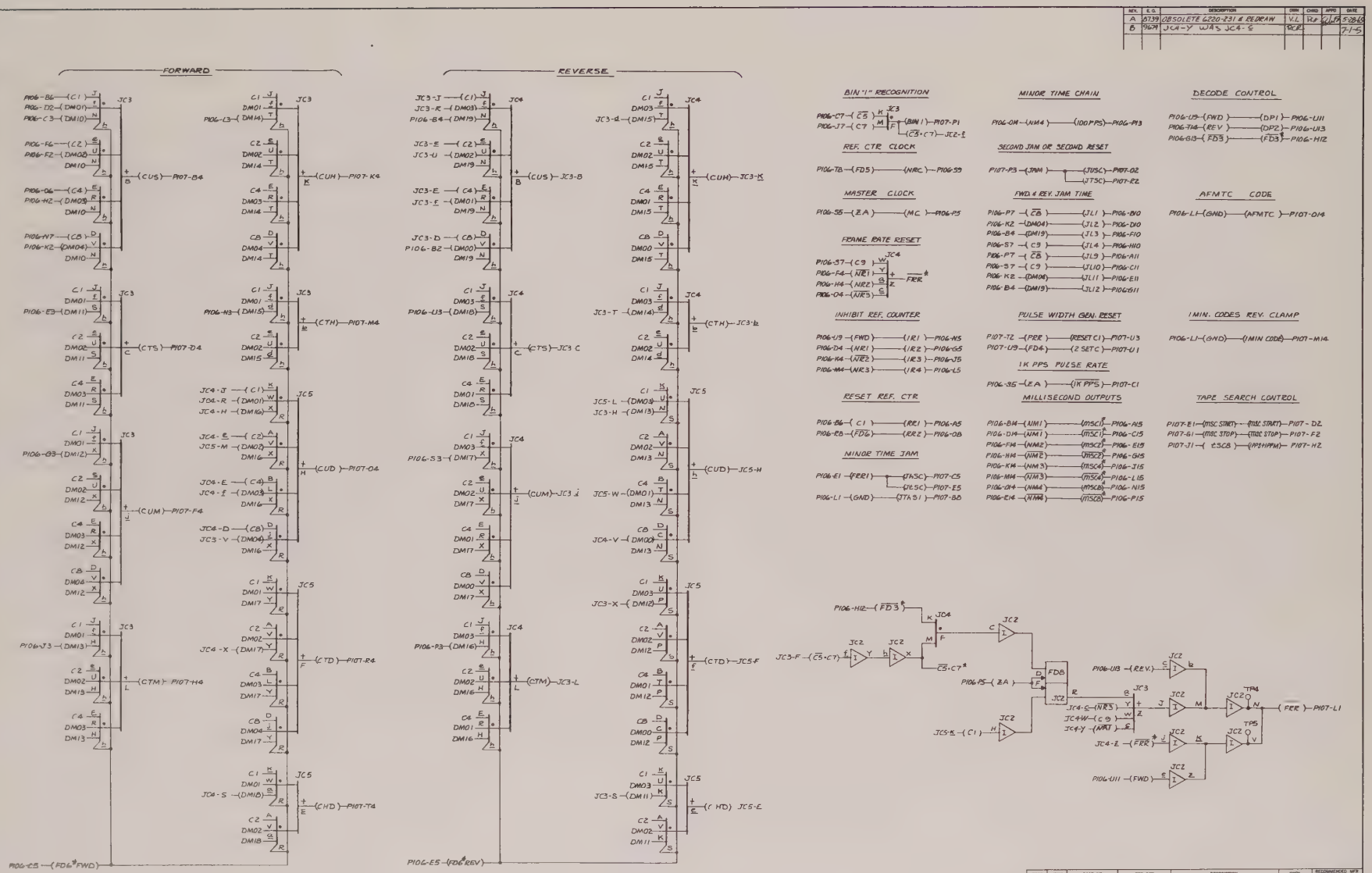
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES .XX ± .010 .XXX ± .005 ANGLES ± 1/2°
DRAWING DATE OF DRAWING 2-10-62
DRAFTSMAN R.OBERTS
CHECKED [illegible]
ENGR. [illegible]
DATE APPD 1-2-66

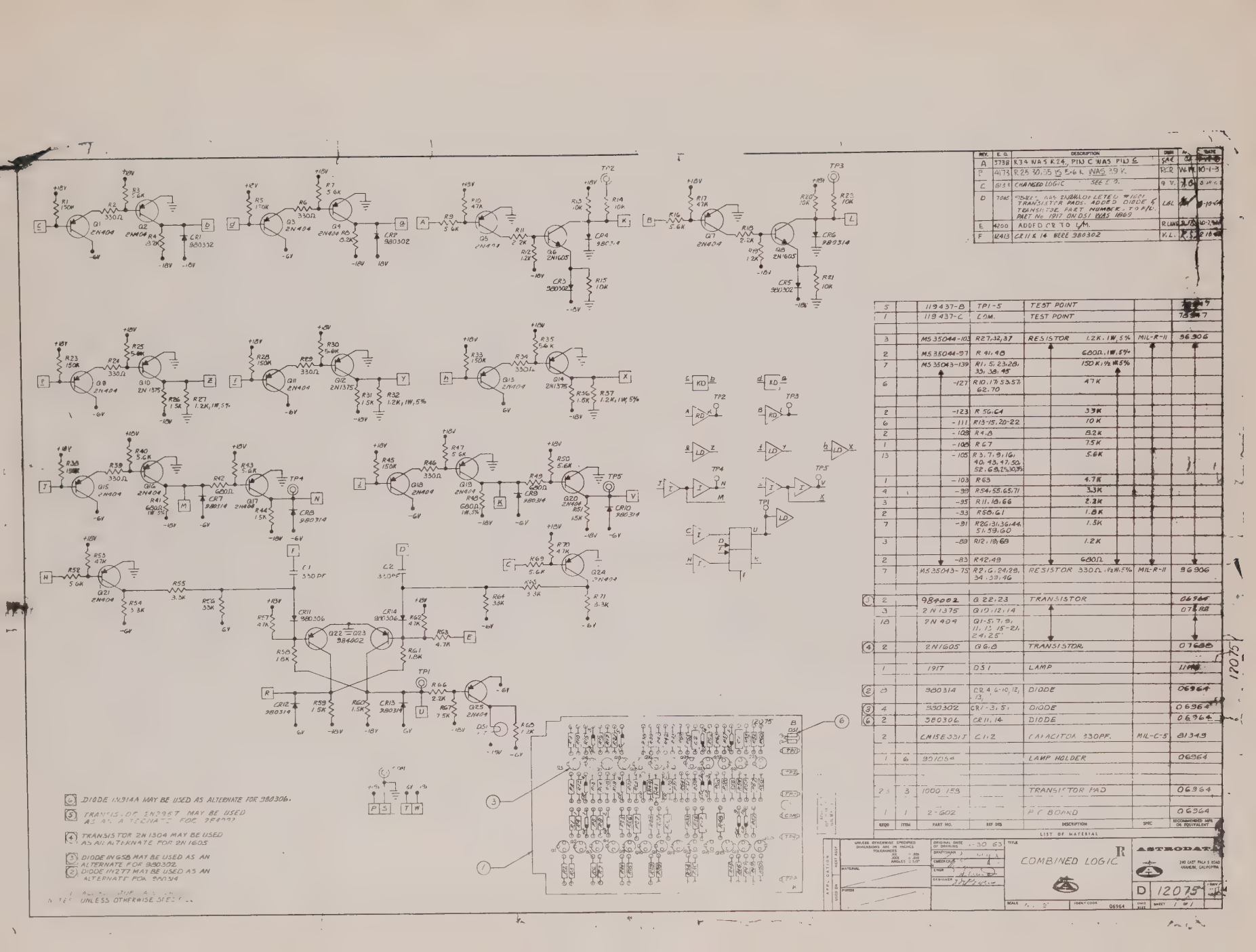
TITLE: CODE PLUG IN ASS'Y. NASA 36 TIME CODE TRANSLATOR

ASTRODATA 240 EAST PRIMA ANAHEIM, CALIF.

SIZE D | 6220-9 | SHEET 1

SCALE FULL | 05261


FORWARD
REVERSE
BIN "1" RECOGNITION
MINOR TIME CHAIN
DECODE CONTROL
REF. CTR CLOCK
SECOND JAM OR SECOND RESET
MASTER CLOCK
FWD & REV JAM TIME
AFMTC CODE
FRAME RATE RESET
INHIBIT REF. COUNTER
PULSE WIDTH GEN. RESET
1 MIN. CODES REV. CLAMP
1K PPS PULSE RATE
RESET REF. CTR
MILLISECOND OUTPUTS
TAPE SEARCH CONTROL
MINOR TIME JAM
REF WIRE LIST NO 6220 7600
P106-E5 (FD6* FWD)
P106-E5 (FD6* REV)
P106-H12 (FD3*)
JC3-F (CB·C7)
CB·C7*
P106-F5 (ZA)
P106-U13 (REV.)
P106-U11 (FWD)
(FER) P107-L1
JC5 15215
JC3, JC4 15216
JC2 12075
CARD SLOT ASSY. NO.
SCHEMATIC TABULATION
LIST OF MATERIAL
CODE TRANSLATOR MODULE LOGIC NASA-36 BIT
ASTRODATA
F 6220-8268 B



REV.	E. O.	DESCRIPTION	DSGN	APP'D	DATE
A	3738	R34 WAS K24, PIN C WAS PIN 5	SAC		10-1-63
B	4173	R25 30, 35 IS 5.6 K WAS 39 K.	R.C.R	W.M.	10-1-3
C	6133	CHANGED LOGIC SEE E.O.	G.V.		8 JAN 64
D	7045	DWG. WAS INCOMPLETED "AS BUILT" TRANSISTOR PADS. ADDED DIODE & TRANSISTOR. PART NUMBER TO P/C. PART No. 1917 ON DSI WAS 1869	L.G.L.		9-19-64
E	4200	ADDED CR TO LM.	R.LANE		10-2-64
F	12413	CR11 & 14 WERE 980302	V.L.		6-18-65

5		119437-B	TP1-5	TEST POINT			79947
1		119437-C	L.M.	TEST POINT			79947
3		MS35044-103	R27,32,37	RESISTOR 1.2K, 1W, 5%	MIL-R-11		96906
2		MS35044-97	R 41, 48	680Ω, 1W, 5%			
7		MS35043-139	R1, 5, 23, 28, 33, 38, 45	150K, ½W, 5%			
6		-127	R10, 17, 53, 57, 62, 70	47K			
2		-123	R 56, 64	33K			
6		-111	R13-15, 20-22	10K			
2		-109	R4, 8	8.2K			
1		-105	R 67	7.5K			
13		-105	R 3, 7, 9, 16, 40, 43, 47, 50, 52, 63, 65, 30, 35	5.6K			
1		-103	R 63	4.7K			
4		-99	R54, 55, 65, 71	3.3K			
3		-95	R11, 18, 66	2.2K			
2		-93	R58, 61	1.8K			
7		-91	R26, 31, 36, 44, 51, 59, 60	1.5K			
3		-89	R12, 19, 68	1.2K			
2		-83	R42, 49	680Ω			
7		MS35043-75	R2, 6, 24, 29, 34, 39, 46	RESISTOR 330Ω, 1W, 5%	MIL-R-11		96906
(3) 2		984002	Q 22, 23	TRANSISTOR			06964
3		2N1375	Q10, 12, 14				07688
18		2N404	Q1-5, 7, 9, 11, 13, 15-21, 24, 25				
(4) 2		2N1605	Q6, 8	TRANSISTOR			07688
1		1917	DS1	LAMP			11946
(2) 3		980314	CR 4, 6-10, 12, 13,	DIODE			06964
(3) 4		980302	CR1-3, 5,	DIODE			06964
(6) 2		380306	CR 11, 14	DIODE			06964
2		CM1E331J	C1, 2	CAPACITOR 330PF.	MIL-C-5		81349
1	6	901064		LAMP HOLDER			06964
25	3	1000 159		TRANSISTOR PAD			06964
1	1	2-602		P C BOARD			06964
REQD	ITEM	PART NO.	REF DES	DESCRIPTION	SPEC		RECOMMENDED MFR OR EQUIVALENT

LIST OF MATERIAL

(6) DIODE 1N914A MAY BE USED AS ALTERNATE FOR 380306.

(5) TRANSISTOR 2N3967 MAY BE USED AS AN ALTERNATE FOR 984002

(4) TRANSISTOR 2N1304 MAY BE USED AS AN ALTERNATE FOR 2N1605

(3) DIODE IN658 MAY BE USED AS AN ALTERNATE FOR 980302.

(2) DIODE IN277 MAY BE USED AS AN ALTERNATE FOR 980314

ALL RESISTANCE VALUES ARE IN OHMS, ± 10% UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES .XX ± .03, .XXX ± .010, ANGLES ± 1/2°

ORIGINAL DATE OF DRAWING 10-30-63

DRAFTSMAN

CHECKED

ENGR

DESIGNER

MATERIAL

FINISH

TITLE: COMBINED LOGIC

R

ASTRODATA

240 EAST PALA S ROAD ANAHEIM, CALIFORNIA

SCALE

IDENT CODE 06964

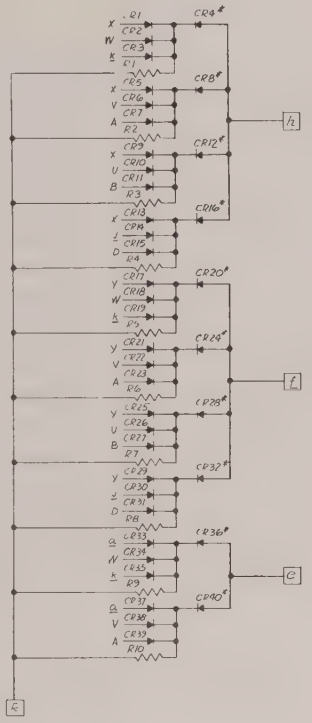
SIZE D

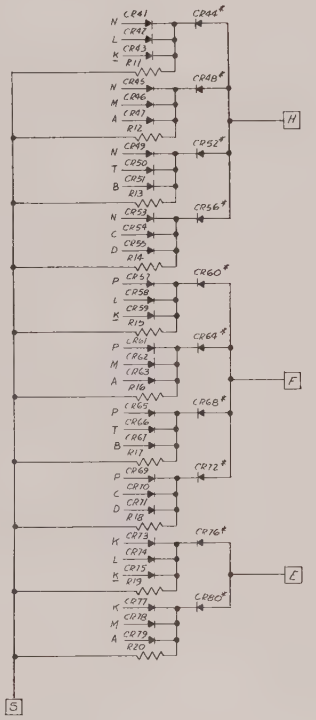
DWG NO. 12075

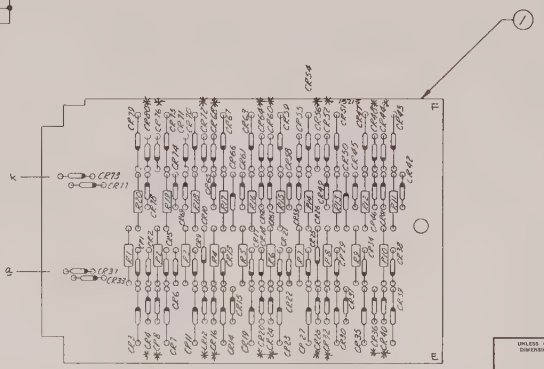
SHEET 1 OF 1

REV

REV.	E. O.	DESCRIPTION	DWN	APPD	DATE
A	617	SEE E.O	KWR		5-1-62
B	2610	UPDATED SCHEM FOR ASTRO SID.	LFC		4-22-63





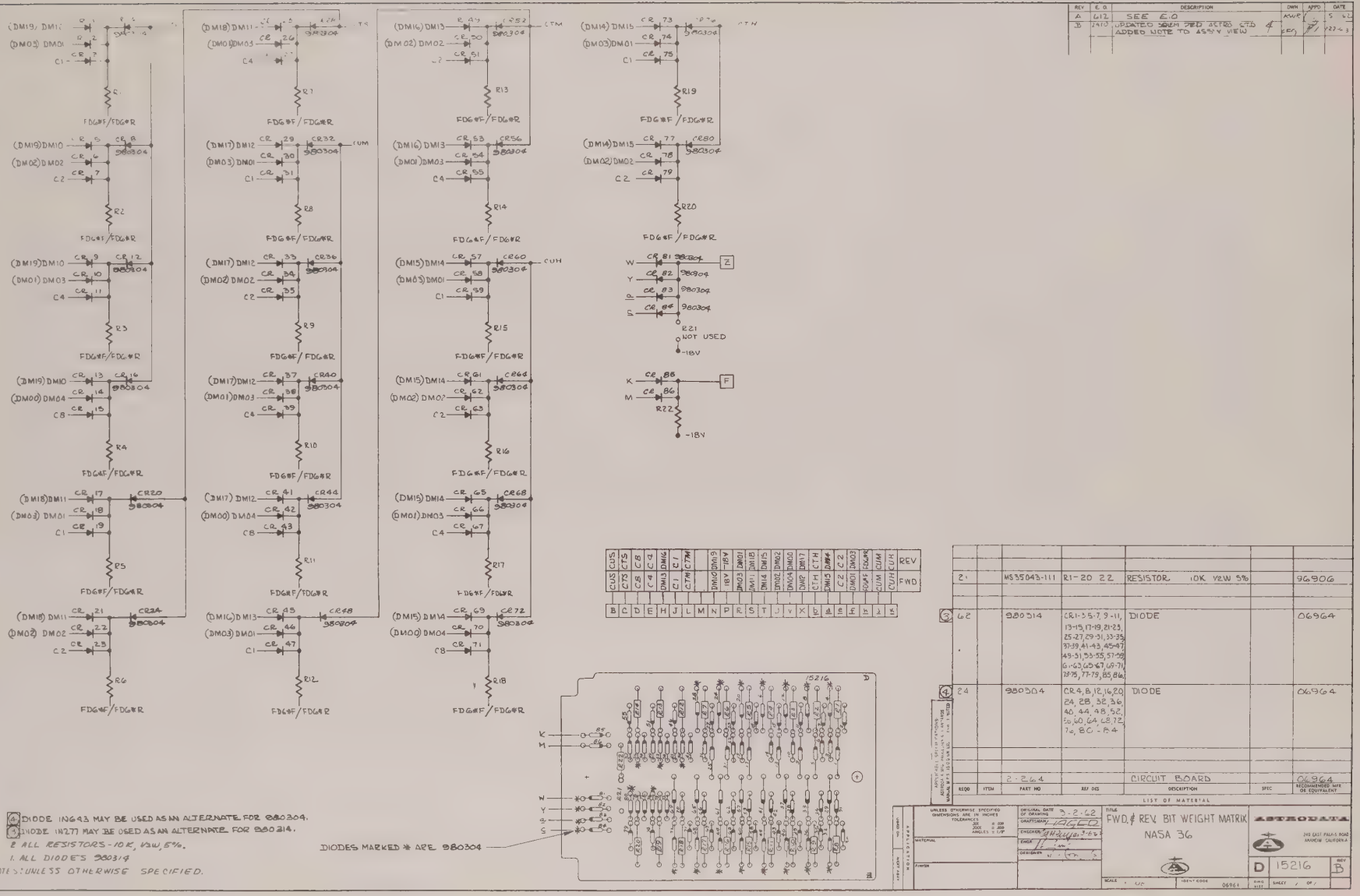


9	60		980314	CR1-3, 5-7, 9-11, 13-15, 17-19, 21-23, 25-27, 29-31, 33-35, 37-39, 41-43, 45-47, 49-51, 53-55, 57-59, 61-63, 65-67, 73-75, 77-79	DIODE	06964
9	20		980304	CR4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80	DIODE	06964
	20		MS35093-111	R1-20	RESISTOR, 10K, ½W, 5%	MIL-R-11	96906
	1	1	8124-227		P.C. BOARD		06964
REQD.	ITEM		PART NO	REF DES	DESCRIPTION	SPEC	MFR

LIST OF MATERIAL — RECOMMENDED MFR. OR EQUIVALENT

(5) DIODE 1N277 MAY BE USED AS AN ALTERNATE FOR 980314.
(9) DIODE 1N642 MAY BE USED AS AN ALTERNATE FOR 980204.
3. ALL OTHER DIODES ARE 980314.
/ ALL DIODES MARKED (9) ARE 980304.
ALL RESISTORS 10K, ½W, 5%
NOTES: UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES: XX = .010, XXX = .005, ANGLES = 1/2°	ORIG MAT'L DATE OF DRAWING 3-15-62	TITLE	ASTRODATA, 620 East Phillips Road, Anaheim, California
	DRAFTSMAN C. Carrillo	NASA 36BIT F&R DAYS B-W MATRIX	
MATERIAL	CHECKED W. Hamilton 3-16		DWG SIZE D — 15215 — B
FINISH	ENGR		SCALE NONE — SHEET 1 OF 1 — REV
	DESIGNER		



REV	E.O.	DESCRIPTION	DWN	APPD	DATE
A	612	SEE E.O.	MWR		5-62
B	2410	UPDATED SDEM 3ED 2ED2 STD 4 ADDED NOTE TO ASSY VIEW	KEY		12-2-63

| REV | FWD | | |

ASTRODATA
240 E. PALAIS ROAD • ANAHEIM, CALIF.

WIRE LIST

USED ON SYSTEM NO. 6220-906 NAME NASA 36 CTM

DWN WILSON CHK'D APP'D

CARD ASS'Y

DWG. NO. 6220-7600

SHEET 1 OF 10

DATE MAY 23, '65

UNLESS OTHERWISE NOTED:
ALL WIRE WHITE 22 AWG STRANDED

	FROM	P106	TO	COLOR	AWG	REMARKS
		E1	P107-C5	9-0-1		FRR1
	JC2-S	L1	P107-B8	-0-		GND
		N1	JC4-P	7-1-8		-18 V
		P1	JC2-P	2-1-8		+18 V
		S1	JC2-T	7-0-6		-6 V
		B2	JC4-V	9-0-2		DM00
		D2	JC3-f	9-0-3		DM01
		F2	JC3-U	9-0-4		DM02
		H2	JC3-R	9-0-5		DM03
	P106-D10	K2	JC3-V	BUSS / 9-0-6		DM04
		C3	JC3-N	9-0-7		DM10
		E3	JC3-S	9-0-8		DM11
		G3	JC3-X	9-0-9		DM12
		J3	JC3-H	9-0-0		DM13
		L3	JC3-T	9-1-1		DM14
		N3	JC3-d	9-1-2		DM15
		P3	JC4-H	9-1-3		DM16
		S3	JC4-X	9-1-4		DM17
		U3	JC4-S	9-1-5		DM18
	P106-F10	B4	JC4-N	BUSS / 9-1-6		DM19
		D4	P106-G5	BUSS		NR1
		F4	JC4-Y	9-1-7		$\overline{\text{NR1}}$
		H4	JC4-a	9-1-8		NR2
		K4	P106-J5	BUSS		$\overline{\text{NR2}}$
		M4	P106-L5	BUSS		NR3
		O4	JC4-c	9-1-9		$\overline{\text{NR3}}$
	P106-P5	R4	JC2-D	BUSS / 9-1-0		$\overline{\text{1KPPS}}$

FORM D-10A

ASTRODATA
240 E. PALAIS ROAD • ANAHEIM, CALIF.

WIRE LIST

USED ON SYSTEM NO. 6220-906 NAME NASA 36 CTM

DWN Wilson CHK'D APP'D

CARD ASS'Y

DWG. NO. 6220-7600
SHEET 2 OF 10
DATE MAY 28, '65

UNLESS OTHERWISE NOTED:
ALL WIRE WHITE 22 AWG STRANDED

	FROM	P106	TO	COLOR	AWG	REMARKS
		A5	P106-B6	BUSS		RR1
		C5	JC3-h	9-2-1		FD6* FWD
		E5	JC4-h	9-2-2		FD6* REV
	P106-D4	G5		BUSS		IR2
	P106-K4	J5		BUSS		IR3
	P106-M4	L5		BUSS		IR4
		N5	P106-U9	BUSS		IR1
	P106-S5	P5	P106-R4	BUSS		MC
		S5	P106-P5	BUSS		ZA
	P106-A5	B6	JC3-J	BUSS/9-2-3		C1
		F6	JC3-e	9-2-4		C2
		O6	JC3-E	9-2-5		C4
		C7	JC3-K	9-2-6		$\overline{C5}$
		J7	JC3-M	9-2-7		C7
		N7	JC3-D	9-2-8		C8
		P7	P106-B10	BUSS		$\overline{C8}$
	P106-H10	S7	JC4-W	BUSS/9-2-9		C9
		U7				
	P106-R8	O8		BUSS		RR2
		R8	P106-O8	BUSS		$\overline{FD6}$
		T8	P106-S9	BUSS		FD5
	P106-T8	S9		BUSS		NRC
	P106-N5	U9	P106-U11	BUSS		FWD

FORM D-10A

ASTRODATA
240 E. PALAIS ROAD • ANAHEIM, CALIF.

WIRE LIST

USED ON SYSTEM 6220-906 (NO.) NASA 36 CTM (NAME)

DWN Wilson CHK'D APP'D

CARD ASS'Y

DWG. NO. 6220-7600

SHEET 3 OF 10

DATE MAY 28, '65

UNLESS OTHERWISE NOTED:
ALL WIRE WHITE 22 AWG STRANDED

	FROM	P106	TO	COLOR	AWG	REMARKS
	P106-P7	B10	P106-A11	BUSS		JL1
	P106-E11	D10	P106-K2	BUSS		JL2
	P106-G11	F10	P106-B4	BUSS		JL3
	P106-C11	H10	P106-S7	BUSS		JL4
	P106-B10	A11				JL9
		C11	P106-H10	BUSS		JL10
		E11	P106-D10	BUSS		JL11
		G11	P106-F10	BUSS		JL12
	P106-U9	U11	JC2-e	BUSS/9-3-1		DP1
	JC4-K	H12	P106-G13	9-3-2/BUSS		$\overline{FD3}$ *
	P106-H12	G13		BUSS		$\overline{FD3}$
		P13	P106-O14	BUSS		100 PPS *
	P106-T14	U13	JC2-c	BUSS/9-3-3		DP2
		B14	P106-A15	BUSS		NM1
		D14	P106-C15	↑		$\overline{NM1}$
		F14	P106-E15	|		$\overline{NM2}$
		H14	P106-G15	|		NM2
		K14	P106-J15	|		NM3
		M14	P106-L15	|		$\overline{NM3}$
	P106-P13	O14	P106-N15	↓		NM4
		R14	P106-P15	BUSS		$\overline{NM4}$
		T14	P106-U13	BUSS		REV

FORM D-10A

ASTRODATA
240 E. PALAIS ROAD • ANAHEIM, CALIF.

WIRE LIST

USED ON SYSTEM 6220-906 NO. NASA 36 CTM NAME

DWN WILSON CHK'D APP'D

CARD ASS'Y

DWG. NO. 6220-7600

SHEET 4 OF 10

DATE MAY 28, '65

UNLESS OTHERWISE NOTED:
ALL WIRE WHITE 22 AWG STRANDED

	FROM	P106	TO	COLOR	AWG	REMARKS
	P106-B14	A15		BUSS		MSC1 *
	P106-D14	C15		↕		$\overline{\text{MSC1}}$ *
	P106-F14	E15				MSC2 *
	P106-H14	G15				$\overline{\text{MSC2}}$ *
	P106-K14	J15				MSC4 *
	P106-M14	L15				$\overline{\text{MSC4}}$ *
	P106-014	N15				MSC8 *
	P106-R14	P15		BUSS		$\overline{\text{MSC8}}$ *

FORM D-10A

ASTRODATA
240 E. PALAIS ROAD • ANAHEIM, CALIF.

WIRE LIST

USED ON SYSTEM NO. 6220-906 NAME NASA 36 CTM

DWN WILSON CHK'D APP'D

CARD ASS'Y

DWG. NO. 6220-7600

SHEET 5 OF 10

DATE MAY 28, '65

UNLESS OTHERWISE NOTED:
ALL WIRE WHITE 22 AWG STRANDED

	FROM	P107	TO	COLOR	AWG	REMARKS
		E1	P107-D2	BUSS		MSC START
		G1	P107-F2	BUSS		MSC STOP
		J1	P107-H2	BUSS		
		L1	JC2-N	9-3-4		$\overline{\text{FRR}}$
		P1	JC3-F	9-3-5		BIN "1"
	P107-U9	U1		BUSS		
	P107-E1	D2		BUSS		MSC START
	P107-G1	F2		BUSS		MSC STOP
	P107-J1	H2		BUSS		1PPS+1PPM
	P107-P3	O2	P107-R2	BUSS		JAM USC
	P107-O2	R2		BUSS		JAM TSC
		T2	P107-U3	BUSS		PRR
		P3	P107-O2	BUSS		JAM
	P107-T2	U3		BUSS		RESET C1
		B4	JC3-B	9-3-6		CUS
		D4	JC3-C	9-3-7		CTS
		F4	JC3-$\underline{j}$	9-3-8		CUM
		H4	JC3-L	9-3-9		CTM
		K4	JC3-$\underline{k}$	9-3-0		CUH
		M4	JC3-$\underline{b}$	9-4-1		CTH
		O4	JC5-H	9-4-2		CUD
		R4	JC5-F	9-4-3		CTD
		T4	JC5-E	9-4-4		CHD
	P106-E1	C5	P107-E5	9-0-1/BUSS		JAM HSC
	P107-C5	E5		BUSS		JAM TSC

FORM D-10A

ASTRODATA
240 E. PALAIS ROAD • ANAHEIM, CALIF.

WIRE LIST

USED ON SYSTEM 6220-906 NO. NASA 36 CTM NAME

DWN Wilson CHK'D APP'D

CARD ASS'Y

DWG. NO. 6220-7600

SHEET 6 OF 10

DATE May 28, '65

UNLESS OTHERWISE NOTED:
ALL WIRE WHITE 22 AWG STRANDED

	FROM	P107	TO	COLOR	AWG	REMARKS
	P106-L1	B8	P107-M14	-O- /BUSS		JTAS1
		U9	P107-U1	BUSS		FD4
	P107-B8	M14	P107-014	BUSS		1 MIN. CODE
	P107-M14	014		BUSS		AFMTC

FORM D-10A

ASTRODATA
240 E. PALAIS ROAD • ANAHEIM, CALIF.

WIRING INSTRUCTIONS FOR CONNECTOR NO. 921004

USED ON SYSTEM NO. 6220-906 NAME NASA 36 CTM

DWG. NO. 6220-7600
SHEET 7 OF 10
DATE MAY 28, '65

DWN Wilson CHK'D APP'D
CARD ASS'Y 12075

UNLESS OTHERWISE NOTED:
ALL WIRE WHITE 22 AWG STRANDED

	FROM	JC2	TO	COLOR	AWG	REMARKS
		A				
		B				
	JC4-F	C				
	P106-R4	D	JC2-F	9-1-0		ZA
		E				
	JC2-D	F				ZA
	JC5-k	H				C1
	JC3-Z	J				
		K				
		L				
	JC2-b	M				
	P107-L1	N	JC2-V	9-3-4		$\overline{\text{FRR}}$
	P106-P1	P		2-1-8		+18V
		R	JC3-a			$\overline{\text{FDB}}$
		S	P106-L1	-0-		GND
	P106-S1	T		7-0-6		-6V
		U				
	JC2-N	V				$\overline{\text{FRR}}$
	JC3-P	W		7-1-8		-18V
		X	JC4-M			
		Y	JC2-k			
		Z	JC2-k			
		a				
		b	JC2-M			
	P106-U13	c		9-3-3		REV
		d				
	P106-U11	e		9-3-1		FWD
	JC3-F	f				$\overline{\text{C5}} \cdot \text{C7}$
	JC2-Y	h				
	JC4-Z	j				$\overline{\text{FRR}}$ *
	JC2-Z	k				

FORM D-20A

ASTRODATA
240 E. PALAIS ROAD • ANAHEIM, CALIF.

WIRING INSTRUCTIONS FOR CONNECTOR NO. 921004

USED ON SYSTEM 6220-906 NO. NASA 36 CTM NAME

DWG. NO. 6220-7600
SHEET 8 OF 10
DATE May 23, '65

DWN WILSON CHK'D APP'D

CARD ASS'Y 15216

UNLESS OTHERWISE NOTED:
ALL WIRE WHITE 22 AWG STRANDED

	FROM	JC3	TO	COLOR	AWG	REMARKS
		A				
	P107-B4	B	JC4-B	9-3-6		CUS
	P107-D4	C	JC4-C	9-3-7		CTS
	P106-N7	D	JC4-D	9-2-8		C8
	P106-06	E	JC4-E	9-2-5		C4
	P107-P1	F	JC2-f	9-3-5		BIN "1" / C5·C7
	P106-J3	H	JC5-N	9-0-0		DM13
	P106-B6	J	JC4-J	9-2-3		C1
	P106-C7	K		9-2-6		C5
	P107-H4	L	JC4-L	9-3-9		CTM
	P106-J7	M		9-2-7		C7
	P106-C3	N		9-0-7		DM10
	JC4-W	P	JC2-W	7-1-8		-18 V
	P106-H2	R	JC4-f	9-0-5		DM03
	P106-E3	S	JC5-K	9-0-8		DM11
	P106-L3	T	JC4-d	9-1-1		DM14
	P106-F2	U	JC4-U	9-0-4		DM02
	P106-K2	V	JC5-j	9-0-6		DM04
	JC4-W	W		9-2-0		C9
	P106-G3	X	JC5-P	9-0-9		DM12
	JC4-c	Y				NR3
		Z	JC2-J			
	JC2-R	a				FD8
	P107-M4	b	JC4-b	9-4-1		CTH
	JC4-Y	c				NR1
	P106-N3	d	JC4-T	9-1-2		DM15
	P106-F6	e	JC4-e	9-2-4		C2
	P106-D2	f	JC4-R	9-0-3		DM01
	P106-C5	h	JC5-R	9-2-1		FD6* FWD
	P107-F4	j	JC4-j	9-3-8		CUM
	P107-K4	k	JC4-K	9-3-0		CUH

FORM D-20A

ASTRODATA
240 E. PALAIS ROAD • ANAHEIM, CALIF.

WIRING INSTRUCTIONS FOR CONNECTOR NO. 921004

USED ON SYSTEM NO. 6220-906 NAME NASA 36 CTM

DWG. NO. 6220-7600
SHEET 9 OF 10
DATE MAY 28, '65

DWN Wilson CHK'D APP'D

CARD ASS'Y 15216

UNLESS OTHERWISE NOTED:
ALL WIRE WHITE 22 AWG STRANDED

	FROM	JC4	TO	COLOR	AWG	REMARKS
		A				
	JC3-B	B				CUS
	JC3-C	C				CTS
	JC3-D	D	JC5-D			C8
	JC3-E	E	JC5-B			C4
		F	JC2-C			
	P106-P3	H	JC5-X	9-1-3		DM16
	JC3-J	J	JC5-k			C1
		K	P106-H12	9-3-2		$\overline{FD3}$ *
	JC3-L	L				CTM
	JC2-X	M				
	P106-B4	N		9-1-6		DM19
	P106-N1	P	JC3-P	7-1-8		-18V
	JC3-f	R	JC5-W			DM01
	P106-U3	S	JC5-a	9-1-5		DM18
	JC3-d	T				DM15
	JC3-U	U	JC5-M			DM02
	P106-B2	V	JC5-C	9-0-2		DM00
	P106-S7	W	JC3-W	9-2-9		C9
	P106-S3	X	JC5-Y	9-1-4		DM17
	P106-F4	Y	JC3-c	9-1-7		$\overline{NR1}$
		Z	JC2-j			$\overline{FRR}$ *
	P106-H4	a		9-1-8		NR2
	JC3-b	b				$\overline{CTH}$
	P106-04	c	JC3-Y	9-1-9		$\overline{NR3}$
	JC3-T	d				
	JC3-e	e	JC5-A			C2
	JC3-R	f	JC5-L			DM03
	P106-E5	h	JC5-S	9-2-2		FD6 * REV
	JC3-j	j				CUM
	JC3-k	k				CUH

FORM D-20A

ASTRODATA
240 E. PALAIS ROAD • ANAHEIM, CALIF.

WIRING INSTRUCTIONS FOR CONNECTOR NO. 921004

USED ON SYSTEM 6220-906 NO. NASA 36 CTM NAME

DWG. NO. 6220-7600
SHEET 10 OF 10
DATE MAY 28, '65

DWN Wilson CHK'D APP'D

CARD ASS'Y 15215

UNLESS OTHERWISE NOTED:
ALL WIRE WHITE 22 AWG STRANDED

	FROM	JC5	TO	COLOR	AWG	REMARKS
	JC4-e	A				C2
	JC4-E	B				C4
	JC4-V	C				DM00
	JC4-D	D				C8
	P107-T4	E	JC5-e	9-4-4		CHD
	P107-R4	F	JC5-f	9-4-3		CTD
	P107-04	H	JC5-h	9-4-2		CUD
		J				
	JC3-S	K				DM11
	JC4-f	L	JC5-U			DM03
	JC4-U	M	JC5-V			DM02
	JC3-H	N				DM13
	JC3-X	P				DM12
	JC3-h	R				FD6* FWD
	JC4-h	S				FD6* REV
	JC5-W	T				DM01
	JC5-L	U				DM03
	JC5-M	V				DM02
	JC4-R	W	JC5-T			DM01
	JC4-H	X				DM16
	JC4-X	Y				DM17
		Z				
	JC4-S	a				DM18
		b				
		c				
		d				
	JC5-E	e				CHD
	JC5-F	f				CTD
	JC5-H	h				CUD
	JC3-V	j				DM04
	JC4-J	k	JC2-H			C1

THE -906 CTM WAS REVISED IN MAY OF 1965. ANY BUILT PRIOR TO THIS DATE REQUIRE THIS MODIFICATION TO MAKE THEM CURRENT. AN OLD ONE HAS NO JC2.

BRUCE WILSON
ASTRODATA INC.

MODIFICATION WIRE LIST

JOB # 43160

DATE MAY 23 '65 PAGE 1 of 1

REMOVE		TERM	COLOR	ADD		TERM	COLOR
TO				TO			
P106-U5	P107-P13						
P107-J13	P107-G13						
P107-S13	P107-U13						
P107-D14	P107-B14						
P106-D14	P107-F14						
P106-O14	P107-H14						
P106-O2	P107-A13						
P107-A13	P107-B12						
P107-B12	P107-O12						
JC5-T	P107-D12						
JC5-a	P107-R12						
JC4-N	P107-K12						
P107-K12	P107-C13						
P106-M2	P107-H12						
P106-N1	JC3-P			JC3-P	JC2-W	-12V	7-1-
				JC4-K	P106-H12	TDB *	9-5-
				JC3-F	JC2-f	CB-C7	-7-
				JC2-Y	JC2-h		-7-
				P106-P1	JC2-P	+12V	2-1-
				P106-L1	JC2-S	GND	-0-
				P106-S1	JC2-T	-6V	7-0-
				JC2-X	JC4-M		-9-
				JC4-F	JC2-C		-9-
				P106-R4	JC2-D	ZA	9-5-
				JC2-D	JC2-F	ZA	-9-
				JC5-k	JC2-H	C1	-1-
				JC2-R	JC3-a	FDB	-9-
				JC4-c	JC3-Y	NRZ	-9-
				P106-U7	JC3-W	C7	9-5-
				JC3-Z	JC2-J		-1-
				P106-U13	JC2-c	P8V	9-5-
				JC2-b	JC2-M		-9-
P107-L1	JC4-Z						
				JC4-Z	JC2-j		-9-
				P106-U11	JC2-e		9-5-5
				JC2-Z	JC2-k		-4-
				P107-L1	JC2-N		
				JC2-N	JC2-V		-1-
				P106-N1	JC4-P	-18	7-
				JC4-P	JC3-P	-18	7-
TO				TO			

Warranty

ASTRODATA, Inc. guarantees this equipment to be free from defects in material and workmanship, for one year from date of delivery. Any repairs, or replacements (which alternative chosen by the manufacturer) will be carried out at the facilities of ASTRODATA, Inc. Should a defect occur in equipment which cannot be returned feasibly because of physical size, or should the defect be trivial, the purchaser will be expected to perform first echelon repairs using materials supplied by ASTRODATA, Inc. Subsequent repairs within the period of warranty will be negotiated separately.

If a defect should result from a design error, and both ASTRODATA, Inc. and the purchaser recognize this error as the cause of the defect, ASTRODATA, Inc. will correct the error to meet the specifications under which the equipment was delivered. ASTRODATA, Inc. retains the right to return the defective equipment to the company's facilities for repair should this course be deemed necessary or advisable.

Equipment, accessories, batteries, and similar items not manufactured by ASTRODATA, Inc. are subject only to adjustments as can be obtained from the original supplier by ASTRODATA, Inc.

This warranty does not apply to any equipment, or portion thereof, which becomes defective through misuse, mishandling, or environmental conditions exceeding specifications, after delivery.

No other warranties, expressed or implied, shall apply to any equipment sold under this warranty, and the foregoing shall constitute the purchaser's sole rights under the agreed terms of this warranty.

In no circumstance shall ASTRODATA, Inc. assume liability for loss, damage or consequential expense arising directly or indirectly from the use of its equipment, separately, or in combination with other equipment.